February 27, 2019

Town of Moosonee
P.O. Box 727
5 First Avenue
Moosonee, ON
P0L 1Y0

Attention: Kaveh Etezadi, Public Works Manager

RE: Moosonee Drinking Water System
2018 Annual Report

Kaveh,

Please find attached the 2018 Annual Operations Report for the Moosonee drinking water system, in accordance with Section 11(1) of O. Reg. 170/03. This report covers the period from January 1 to December 31 and meets the requirement of being prepared by February 28 of this year.

Please ensure that a copy of this report is given, without charge, to every person who requests a copy. In addition, please make certain that effective steps are taken to advise residents that copies of the report are available, and of how a copy can be obtained.

Finally, as per Schedule 22 of O. Reg. 170/03, please ensure that a copy of the report is given to the members of municipal council no later than March 31, 2019.

If you have any questions regarding the report, we would be pleased to address them and you should contact the undersigned accordingly.

Sincerely,

VEOLIA WATER CANADA INC.

Greg Prangley
Project Manager

c. T. Keefe, Moosonee operations

Veolia North America
80 Birmingham St
Hamilton, ON L8L 6W5

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2018 ANNUAL REPORT FOR WATER SYSTEMS

Part 1 – ANNUAL REPORT (as required by O. Reg. 170/03, Section 11)

Drinking-Water System Number:	260007114
Drinking-Water System Name:	Moosonee Drinking Water System
Drinking-Water System Owner:	Corporation of the Town of Moosonee
Drinking-Water System Category:	Large Municipal Residential
Period being reported:	January 1-December 31, 2018

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Complete if your Category is Large Municipal Residential or Small Municipal Residential	Complete for all other Categories
Does your Drinking-Water System serve more than 10,000 people? ☐ Yes ☑ No	Number of Designated Facilities served: n/a
Is your annual report available to the public at no charge on a web site on the Internet? ☐ Yes ☑ No	Did you provide a copy of your annual report to all Designated Facilities you serve? ☐ Yes ☐ No
Location where Summary Report required under O. Reg. 170/03 Schedule 22 will be available for inspection. **Municipal Office** **5 First Avenue** **Moosonee, ON** **Tel: (705)336-2993**	Number of Designated Facilities served: n/a
	Did you provide a copy of your annual report to all Interested Authorities you report to for each Designated Facility? ☐ Yes ☐ No

List all Drinking-Water Systems (if any), which receive all of their drinking water from your system:

Drinking Water System Name	Drinking Water System Number
n/a	

Did you provide a copy of your annual report to all Drinking-Water System owners that are connected to you and to whom you provide all of its drinking water?

n/a

Indicate how you notified system users that your annual report is available, and is free of charge.

☐ Public access/notice via the web	☑ Public access/notice via Government Office	☑ Public access/notice via a newspaper
☑ Public access/notice via Public Request	☐ Public access/notice via a Public Library	☑ Public access/notice via other method local bulletin boards and the community television channel_

Describe your Drinking Water System

Surface water supply from the Moose River. Water treatment plant rated at 3000 m³/day consisting of a dual train package unit with in-line flash mixing, two-stage flocculation, upflow solids contact clarifier

with automatic sludge withdrawal, and dual media filters with air scour/water backwash. There are separate chemical feed systems for primary coagulant, coagulant aid, disinfection and pH adjustment. Sludge is gravity settled in the clarifier then thickened and dewatered in a sludge bagging system for disposal at the local landfill. There is a 2140 m³ reservoir for treated water storage.

List all water treatment chemicals used over this reporting period

Coagulant - polyaluminum chloride
Coagulant aid - polymer
Disinfection – sodium hypochlorite
pH adjustment – caustic soda

Please provide a brief description and a breakdown of monetary expenses incurred

Flow meter calibrations (Lakeside Controls) $6000
Lab Supplies and analyzer reagent kits (Hach Canada) $1200
Process Chemicals $104828.38
Prominent online chlorine probe $ 2526.80

Provide details on the notices submitted in accordance with subsection 18(1) of the Safe Drinking-Water Act or section 16-4 of Schedule 16 of O.Reg.170/03 and reported to Spills Action Centre

Incident Date	Parameter	Result	Corrective Action	Corrective Action Date
January 21, 2018	Main break	No air gap so treated as a Category 2	Precautionary BWA issued. Sampled	Jan. 30, 2018

Microbiological testing done under the Schedule 10, 11 or 12 of Regulation 170/03, during this reporting period

	Number of Samples	Range of E.Coli Results (min #) - (max #)	Range of Total Coliform Results (min #) - (max #)	Number of HPC Samples	Range of HPC Results (min #) - (max #)
Raw	52	<2-35*	18-570*	n/a	n/a
Treated	52	0	0	52	<1-10
Distribution	133	0	0	52	<1-10

*note that samples from May 8,15, June 19, July 16, Oct. 16, 22 were "overgrown" for both E. coli and coliforms

Operational testing done under Schedule 7, 8 or 9 of Regulation 170/03 during the period covered by this Annual Report

	Number of Grab Samples	Range of Results (min #) – (max #)	Units
Filter #1 effluent turbidity	**8760**	**0.01-2.0***	**NTU**
Filter #2 effluent turbidity	**8760**	**0.01-2.00***	**NTU**
Chlorine (POE)	**8760**	**0.53-1.55**	**mg/L**
Chlorine (distribution)	**448**	**0.10**-1.52**	**mg/L**
Fluoride (If the DWS provides fluoridation)	**n/a**	**n/a**	

* 6 incidents of water exceeding the regulatory limit (1.0NTU) entering the distribution system but less than 15 mins. All other occurrences of greater than 1.0NTU were due to backwashing and calibrations. This flow goes to waste

** The instance when POE Cl2 dropped to 0.00 and any other instance where it is dropped below normal operating dosage is due to calibration and maintenance of CL-17 analyzer. During these instances residuals are taken every 5 minutes and recorded in the logbook.

Summary of additional testing and sampling carried out in accordance with the requirement of an approval, order or other legal instrument				
Date of legal instrument issued	**Parameter**	**Date Sampled**	**Result**	**Unit of Measure**
None				

Summary of Inorganic parameters tested during this reporting period or the most recent sample results				
Parameter	**Sample Date**	**Result Value**	**Unit of Measure**	**Exceedance**
Antimony	11/20/2018	<0.5	µg/L	No
Arsenic	11/20/2018	<1	µg/L	No
Barium	11/20/2018	7.0	µg/L	No
Boron	11/20/2018	5.0	µg/L	No
Cadmium	11/20/2018	<0.1	µg/L	No
Chromium	11/20/2018	<1	µg/L	No
Lead-see results below				
Mercury	11/20/2018	<0.1	µg/L	No
Selenium	11/20/2018	<1	µg/L	No
Sodium	11/20/2018	13.0	mg/L	No
Uranium	11/20/2018	<1	µg/L	No
Fluoride	11/20/2018	<0.025	mg/L	No
Nitrite	02/13/2018	<0.03	mg/L	No
Nitrate	02/13/2018	0.15	mg/L	No
Nitrite	05/15/2018	<0.03	mg/L	No
Nitrate	05/15/2018	<0.1	mg/L	No
Nitrite	07/31/2018	<0.03	mg/L	No
Nitrate	07/31/2018	0.22	mg/L	No
Nitrite	11/20/2018	<0.008	mg/L	No
Nitrate	11/20/2018	0.03	mg/L	No

Summary of Lead Results during this reporting period (Winter: Dec. 15/17-April 15/18; Summer: June 15-Oct. 15/18				
Sampling Period	Range of Results (µg/L) from Residential Samples (# of Samples taken)	Non-residential locations	Distribution System	Any Adverse Water Quality Incidents?
Winter	No samples required	n/a	n/a (2)	No
Summer	No samples required	n/a	n/a(2)	No

Note: only alkalinity analysis was required in the distribution system in 2018

Summary of Organic parameters tested during this reporting period or the most recent sample results				
Parameter	**Sample Date**	**Result Value**	**Unit of Measure**	**Exceedance**
Alachlor	11/20/2018	ND	µg/L	NO
Atrazine + N-dealkylated metobolites	11/20/2018	ND	µg/L	NO
Azinphos-methyl	11/20/2018	ND	µg/L	NO
Benzene	11/20/2018	ND	µg/L	NO
Benzo(a)pyrene	11/20/2018	ND	µg/L	NO
Bromoxynil	11/20/2018	ND	µg/L	NO
Carbaryl	11/20/2018	ND	µg/L	NO
Carbofuran	11/20/2018	ND	µg/L	NO
Carbon Tetrachloride	11/20/2018	ND	µg/L	NO
Chlorpyrifos	11/20/2018	ND	µg/L	NO
Diazinon	11/20/2018	ND	µg/L	NO
Dicamba	11/20/2018	ND	µg/L	NO
1,2-Dichlorobenzene	11/20/2018	ND	µg/L	NO
1,4-Dichlorobenzene	11/20/2018	ND	µg/L	NO
1,2-Dichloroethane	11/20/2018	ND	µg/L	NO
1,1-Dichloroethylene (vinylidene chloride)	11/20/2018	ND	µg/L	NO
Dichloromethane	11/20/2018	ND	µg/L	NO
2-4 Dichlorophenol	11/20/2018	ND	µg/L	NO
2,4-Dichlorophenoxy acetic acid (2,4-D)	11/20/2018	ND	µg/L	NO
Diclofop-methyl	11/20/2018	ND	µg/L	NO
Dimethoate	11/20/2018	ND	µg/L	NO
Diquat	11/20/2018	ND	µg/L	NO
Diuron	11/20/2018	ND	µg/L	NO
Glyphosate	11/20/2018	ND	µg/L	NO
Malathion	11/20/2018	ND	µg/L	NO
MCPA	11/20/2018	ND	µg/L	NO
Metolachlor	11/20/2018	ND	µg/L	NO
Metribuzin	11/20/2018	ND	µg/L	NO
Monochlorobenzene	11/20/2018	ND	µg/L	NO
Paraquat	11/20/2018	ND	µg/L	NO
Pentachlorophenol	11/20/2018	ND	µg/L	NO
Phorate	11/20/2018	ND	µg/L	NO
Picloram	11/20/2018	ND	µg/L	NO
Polychlorinated Biphenyls(PCB)	11/20/2018	ND	µg/L	NO
Prometryn	11/20/2018	ND	µg/L	NO
Simazine	11/20/2018	ND	µg/L	NO
THM (NOTE: show latest annual average)	Q1-Q4 2018	82.1	µg/L	NO
Terbufos	11/20/2018	ND	µg/L	NO
Tetrachloroethylene	11/20/2018	ND	µg/L	NO
2,3,4,6-Tetrachlorophenol	11/20/2018	ND	µg/L	NO

Triallate	11/20/2018	ND	µg/L	NO
Trichloroethylene	11/20/2018	ND	µg/L	NO
2,4,6-Trichlorophenol	11/20/2018	ND	µg/L	NO
Trifluralin	11/20/2018	ND	µg/L	NO
Vinyl Chloride	11/20/2018	ND	µg/L	NO

ND=Non-detect (below measurable limit)

List any Inorganic or Organic parameter(s) that exceeded half the standard prescribed in Schedule 2 of Ontario Drinking Water Quality Standards.

Parameter	Sample Date	Result Value	Unit of Measure	ODWS Criteria
Total THMs (annual avg.)	2018 (Q1-Q4)	82.1	µg/L	100
Sodium	11/20/2018	13.0	mg/L	20

Part 2 – SUMMARY REPORT (as required by O. Reg. 170/03, Schedule 22)

Non-Compliance with Legislations, Regulations, Approvals & Orders
During this period, the Facility was operated in full compliance with the Act, the regulations and the Facility's approval, save and except for the following:

1) Continuous monitoring of filter effluent lines was not being performed for turbidity (July 2/3, 2018)
   Action Required: The owner and operating authority must ensure compliance with the continuous monitoring requirements
   Action Completed: maintenance and troubleshooting performed on the analyzer. No further action required
2) All continuous monitoring equipment utilized for sampling and testing was not equipped with alarms or shut off mechanisms
   Action Required: Monitoring equipment must have a feature that ensures that not water is directed to users if equipment malfunctions or loses power. Continuous monitoring equipment must cause an alarm to signal immediately when the equipment malfunctions or loses power
   Action Completed: alarms were installed on both the continuous chlorine analyzer and the filter effluent turbidimeters

SUMMARY OF RECOMMENDATIONS AND BEST PRACTICE ISSUES AS PER 2018 MOE INSPECTION
This section provides a summary of all recommendations and best practice issues identified during the inspection period. Details pertaining to these items can be found in the body of the inspection report. In the interest of continuous improvement in the interim, it is recommended that owners and operators develop an awareness of the following issues and consider measures to address them.

The owner had not implemented a program for the flushing of watermains as per industry standards.
Presently, no routine flushing occurs in the Moosonee distribution system.
Recommendation: It is recommended that the owner develop and implement a routine flushing program within the Moosonee distribution system as per American Water Works Association Standards G200-04 to address and prevent water quality problems, remove accumulated sediments, improve water flow and reduce chlorine demand.
2. A program for inspecting and exercising valves did not exist.
Presently, no routine inspecting or exercising of valves is conducted in the Moosonee distribution system.
Recommendation:
It is recommended that the owner develop and implement a routine valve inspection and exercising program within the Moosonee distribution system as per American Water Works Association Standard G200-04 to ensure thorough knowledge of operable valves and reduce the number of inoperable valves within the system.
3. There was no program in place for inspecting and operating hydrants.
Presently, no routine inspection and operation of hydrants occurs within the Moosonee distribution system. However, in the summer of 2018 the Town of Moosonee retained Skomorah Hydrant Services out of Thunder Bay to inspect each of the fire hydrants and repair where necessary.
Recommendation:

It is recommended that the owner develop and implement an annual or semi-annual fire hydrant inspection and operation program to identify and repair unserviceable hydrants to ensure that all hydrants within the distribution system are functioning.

The following issues were also noted during the inspection:

1. The Moosonee WTP bagger system has been unserviceable for several years. This places an added, unnecessary burden on the operation of the sanitary sewer and lagoon system. No efforts have been made to repair and restore this equipment.
2. There is no alarm tied in to the pressure gauge to alert operators when treated water going into the distribution system is reduced below 20 pounds psi.
3. The condition of the current operations manual makes it unclear whether all of the details of the operating procedures provided in the manual are still applicable to the manner in which the drinking water system is currently operated.
4. The concrete containment curbs for process chemical storage are deteriorating and appear to allow seeping of chemicals through cracks or permeable areas of the concrete barrier at floor level.
5. On a few occasions during the inspection period the SCADA software failed to properly record continuous monitoring data on the local desktop computer such that operators could easily review continuous data as required by Section 6-5(1)3 of Schedule 6 to O. Reg. 170/03.

Recommendation:

1. It is recommended that the owner enlist the services of a knowledgeable contractor to repair the sludge bagger system at the WTP.
2. It is recommended that the owner adds an alarm to the pressure of water leaving the WTP such that operators are alerted when there is a drop below the industry standard of 20 psi.
3. It is recommended that the owner and operating authority for the system:

- Update the operations and maintenance manual to reflect current operating practices so that new operators can confidently rely on information presented in the manual to guide decision making in the operation of the drinking water system
- Remove factually incorrect and otherwise confusing information from the operations manual.
- An updated operations manual should include standard operating procedures for at least, but not limited to, the following routine activities:
- roles and responsibilities for water operators, public works employees and contractors for repairing watermain breaks
- roles and responsibilities for water operators, public works employees and contractors for dealing with boil water advisories issued by the public health unit or the Town of Moosonee
- schedules and procedures for in-house calibration, maintenance and operation of continuous analysers
- alarm response procedures
- data review protocol and procedures
- adverse reporting procedures
- operation of plant – pumps and filters, chemical dosing along with operational and compliance set points for start and stop
- backwash procedures
- sludge handling procedures
- maintenance and operation of chemical metering pumps
- generator operation and maintenance schedule
- roles and responsibilities for flushing the distribution system and inspecting and operating hydrants and valves.

4. It is recommended that the owner retain the services of a qualified person to assess the condition of the concrete containment curbs and propose potential solutions for sealing the curbs with a product compatible with the process chemicals used at the WTP.
5. Gaps in the continuous data on the local desktop computer have been a long standing, repeat issue noted in past inspection reports. The owner and operating authority are encouraged to continue to move forward with the proposed SCADA upgrades and to ensure that operators can easily retrieve any missing data to ensure compliance with the continuous monitoring requirements of Schedule 6 of O. Reg. 170/03.

System Capability Assessment			
Comparison of Flow Rates (m^3/d):			
Month	**Average Flow**	**Maximum Flow**	**Max Instantaneous flow (L/s)**
January	879	1655	72.5
February	884	1072	33.0
March	764	877	38.1
April	750	788	14.5
May	766	1797	39.2
June	713	784	53.3
July	638	1415	64.6
August	600	1047	78.2
September	613	783	63.8
October	616	725	63.4
November	603	1186	55.3
December	644	686	14.8
AVERAGE	**733**	**n/a**	**n/a**
MAXIMUM	**n/a**	**1797**	**78.2**
SYSTEM CAPACITY	**2998**	**2998**	**-**
% CAPACITY	**24.4%**	**59.9%**	**n/a**